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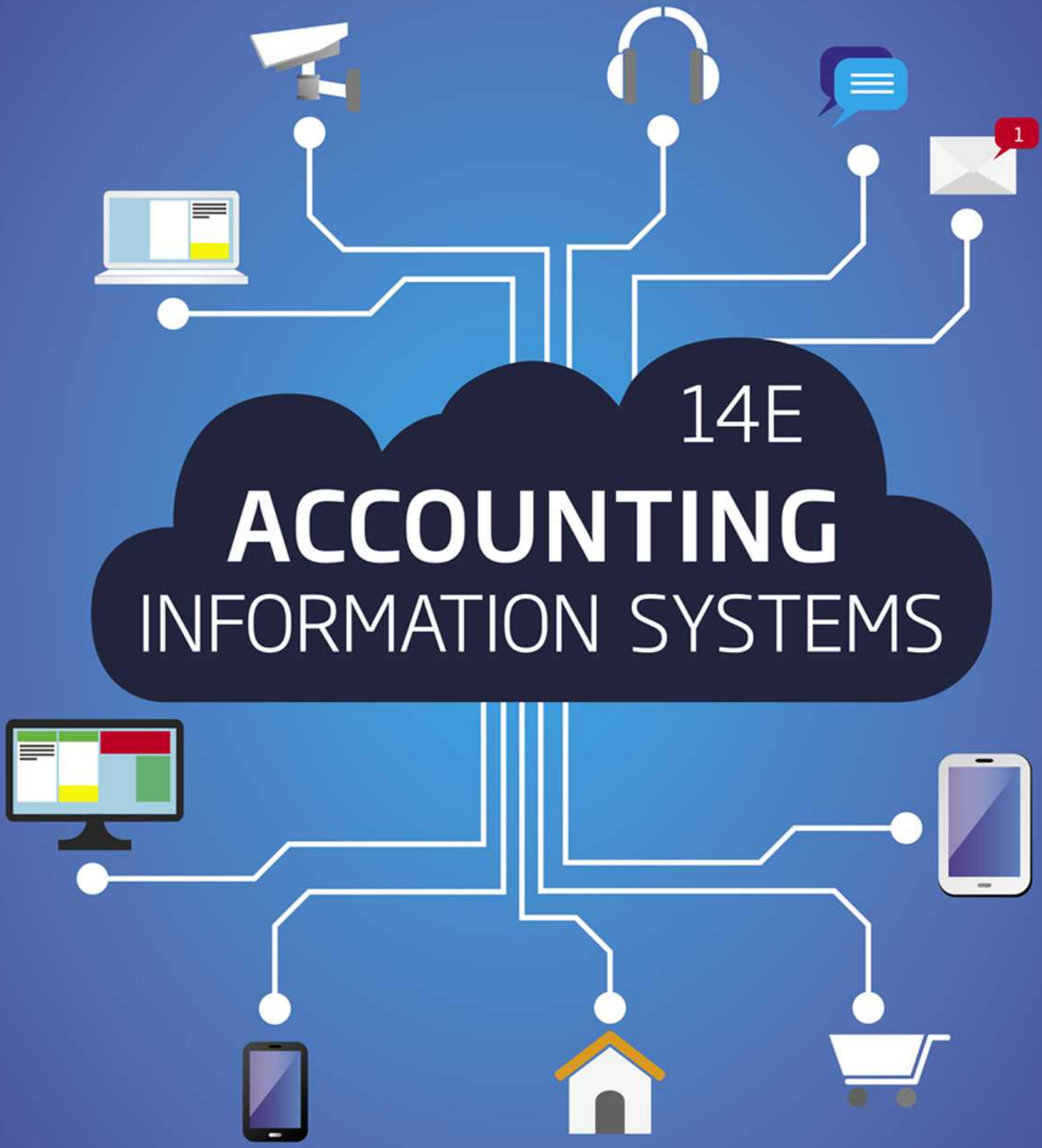

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ACCOUNTING INFORMATION SYSTEMS

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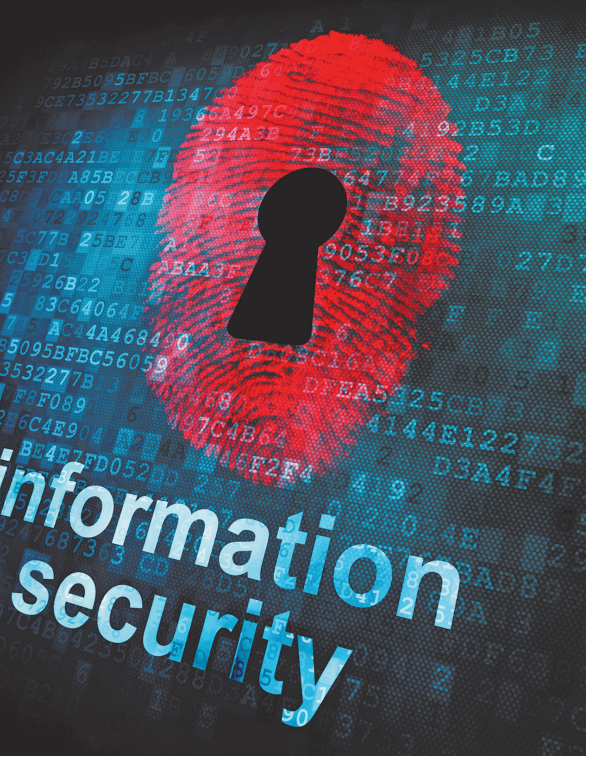

Accounting Information Systems

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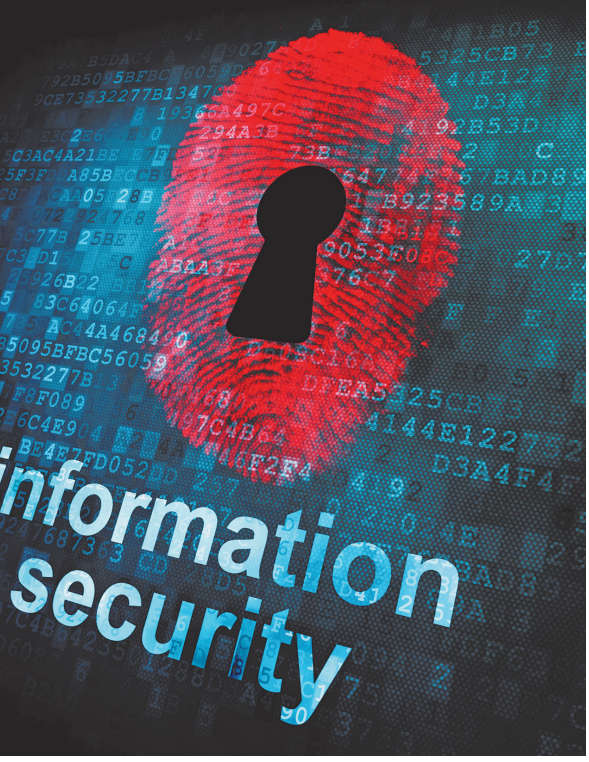

Accounting Information Systems

FOURTEENTH EDITION

Marshall B. Romney
Brigham Young University

Paul John Steinbart
Arizona State University

Pearson

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Brief Contents

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Preface

To the Instructor

This book is intended for use in a one-semester course in accounting information systems at either the undergraduate or graduate level. Introductory financial and managerial accounting courses are suggested prerequisites, and an introductory information systems course that covers a computer language or software package is helpful, but not necessary.

The book can also be used as the main text in graduate or advanced undergraduate management information systems courses.

The topics covered in this text provide information systems students with a solid understanding of transaction processing systems that they can then build on as they pursue more in-depth study of specific topics such as databases, data warehouses and data mining, networks, systems analysis and design, cloud computing, virtualization, computer security, and information system controls.

ENHANCEMENTS IN THE FOURTEENTH EDITION

We made extensive revisions to the content of the material to incorporate recent developments, while retaining the features that have made prior editions easy to use. Every chapter has been updated to include up-to-date examples of important concepts. Specific changes include:

1. We discuss the new revision to the COSO framework and have updated the discussion of IT controls to reflect the new distinction between governance and management that was introduced in COBIT 5.
2. Updated discussion of information security countermeasures, including the security and control implications associated with virtualization and cloud computing.
3. Updated end-of-chapter discussion questions and problems, including Excel exercises that are based on articles from the *Journal of Accountancy* so that students can develop the specific skills used by practitioners. Most chapters also include a problem that consists of multiple-choice questions that we have used in our exams to provide students with an additional chance to check how well they understand the chapter material.
4. Many new computer fraud and abuse techniques have been added to help students understand the way systems are attacked.
5. Chapter 21 includes a new section on agile development technologies that discusses scrum development, extreme programming, and unified process development.

CUSTOMIZING THIS TEXT

Pearson Custom Library can help you customize this textbook to fit how you teach the course. You can select just the chapters from this text that you plan to cover and arrange them in the sequence you desire. You even have the option to add your own material or third party content.

In addition, you may choose an alternate version of the REA material presented in Chapters 17–19 that uses the Batini style notation instead of the crows feet notation featured in this book.

To explore how to create a customized version of the book you can contact your Pearson representative.

SUPPLEMENTAL RESOURCES

As with prior editions, our objective in preparing this fourteenth edition has been to simplify the teaching of AIS by enabling you to concentrate on classroom presentation and discussion, rather than on locating, assembling, and distributing teaching materials. To assist you in this process, the following supplementary materials are available to adopters of the text:

- *Solutions Manual* prepared by Marshall Romney at Brigham Young University and Paul John Steinbart at Arizona State University
- *Instructors Manual* prepared by Robyn Raschke at University of Nevada–Las Vegas
- *Test Item File* prepared by Lawrence Chui at University of St. Thomas
- *TestGen testing software*, a computerized test item file
- *PowerPoint Presentation* slides developed by Robyn Raschke at University of Nevada–Las Vegas

The fourteenth edition includes an entirely new set of PowerPoint slides that make extensive use of high-quality graphics to illustrate key concepts. The slides do not merely consist of bullet points taken verbatim from the text, but instead are designed to help students notice and understand important relationships among concepts. The large number of slides provides instructors a great deal of flexibility in choosing which topics they wish to emphasize in class.

In addition, you can access all these supplements from the protected instructor area of www.pearsonhighered.com.

We recognize that you may also wish to use specific software packages when teaching the AIS course. Contact your Pearson representative to learn about options for bundling this text (or a customized version) with software packages or other texts such as *Computerized Practice Set for Comprehensive Assurance & System Tool (CAST); Manual Practice Set for Comprehensive Assurance and Systems Tool (CAST); Comprehensive Assurance & System Tools (CAST): An Integrated Practice Set; or Assurance Practice Set for Comprehensive Assurance & System Tool (CAST)*, all written by Laura R. Ingraham and J. Gregory Jenkins, both at North Carolina State University.

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To the Student

As did previous editions, the fourteenth edition of *Accounting Information Systems* is designed to prepare you for a successful accounting career whether you enter public practice, industry, or government. All of you will be users of accounting information systems. In addition to being users, some of you will become managers. Others will become internal and external auditors, and some of you will become consultants. Regardless of your role, you will need to understand how accounting information systems work in order to effectively measure how cost-effectively

they perform, to assess their reliability and that of the information produced, or to lead the redesign and implementation of new and better systems. Mastering the material presented in this text will give you the foundational knowledge you need in order to excel at all those tasks.

This text discusses important new IT developments, such as virtualization and the move to cloud computing, because such developments affect business processes and often cause organizations to redesign their accounting systems to take advantage of new capabilities. The focus, however, is not on IT for the sake of IT, but on how IT affects business processes and controls. Indeed, new IT developments not only bring new capabilities, but also often create new threats and affect the overall level of risk. This text will help you understand these issues so that you can properly determine how to modify accounting systems controls to effectively address those new threats and accurately assess the adequacy of controls in those redesigned systems. We also discuss the effect of recent regulatory developments, such as the SEC mandate to use XBRL and the pending switch from GAAP to IFRS, on the design and operation of accounting systems.

In addition to technology- and regulatory-driven changes, companies are responding to the increasingly competitive business environment by reexamining every internal activity in an effort to reap the most value at the least cost. As a result, accountants are being asked to do more than simply report the results of past activities. They must take a more proactive role in both providing and interpreting financial and nonfinancial information about the organization's activities. Therefore, throughout this text we discuss how accountants can improve the design and functioning of the accounting information system (AIS) so that it truly adds value to the organization by providing management with the information needed to effectively run an organization.

Key Learning Objectives

When you finish reading this text, you should understand the following key concepts:

- The basic activities performed in the major business cycles
- What data needs to be collected to enable managers to plan, evaluate, and control the business activities in which an organization engages
- How IT developments can improve the efficiency and effectiveness of business processes
- How to design an AIS to provide the information needed to make key decisions in each business cycle
- The risk of fraud and the motives and techniques used to perpetrate fraud
- The COSO and COSO-ERM models for internal control and risk management, as well as the specific controls used to achieve those objectives
- The Control Objectives for Information and Related Technology (COBIT) Framework for the effective governance and control of information systems and how IT affects the implementation of internal controls
- The AICPA's Trust Services framework for ensuring systems reliability by developing procedures to protect the confidentiality of proprietary information, maintain the privacy of personally identifying information collected from customers, assure the availability of information resources, and provide for information processing integrity
- Fundamentals of information security
- Goals, objectives, and methods for auditing information systems
- Fundamental concepts of database technology and data modeling and their effect on an AIS
- The tools for documenting AIS work, such as REA diagrams, data flow diagrams, business processing diagrams, and flowcharts
- The basic steps in the system development process to design and improve an AIS

Features to Facilitate Learning

To help you understand these concepts the text includes the following features:

1. **Each chapter begins with an integrated case that introduces that chapter's key concepts and topics and identifies several key issues or problems that you should be able**

to solve after mastering the material presented in that chapter. The case is referenced throughout the chapter and the chapter summary presents solutions to the problems and issues raised in the case.

2. **Focus Boxes and real-world examples** to help you understand how companies are using the latest IT developments to improve their AIS.
3. **Hands-on Excel exercises in many chapters** to help you hone your computer skills. Many of these exercises are based on "how-to" tutorials that appeared in recent issues of the *Journal of Accountancy*.
4. **Numerous problems in every chapter** provide additional opportunities for you to demonstrate your mastery of key concepts. Many problems were developed from reports in current periodicals. Other problems were selected from the various professional examinations, including the CPA, CMA, CIA, and SMAC exams. One problem consists of a set of multiple-choice questions in order to provide practice in answering exam-style questions. **Each chapter also has one or more cases** that require more extensive exploration of specific topics.
5. **Chapter quizzes** at the end of each chapter enable you to self-assess your understanding of the material. We also provide detailed explanations about the correct answer to each quiz question.
6. **Extensive use of Full-Color Graphics.** The text contains hundreds of figures, diagrams, flowcharts, and tables that illustrate the concepts taught in the chapters. Color is used to highlight key points.
7. Definitions of key terms are repeated in the **glossary margins** in each chapter. In addition, a **comprehensive glossary** located at the back of the book makes it easy to look up the definition of the various technical terms used in the text.
8. **Extensive on-line support** at Pearson's content-rich, text-supported Companion Website at www.pearsonhighered.com/romney/.

Excel Homework Problems

Accountants need to become proficient with Excel because it is a useful tool for tasks related to every business process. That is why each of the chapters in the business process section contains several homework problems that are designed to teach you new Excel skills in a context related to one of the business processes discussed in the chapter.

As with any software, Microsoft regularly releases updates to Microsoft Office, but not everyone always immediately switches. Eventually, however, during your career you will periodically move to a newer version of Excel. When you do, you will find that sometimes you need make only minor changes to existing spreadsheets, but other times you may have to make more significant changes because the newer version of Excel now incorporates different features and functions.

So how do you keep abreast of changes? And how can you learn new Excel skills "on the job" to simplify tasks that you now find yourself doing repeatedly? You could pay to take a course, but that can be costly, time-consuming and may not always be timely. Alternatively, you can develop life-long learning skills to continuously update your knowledge. One important way to do this is to begin now to save copies of two types of articles that regularly appear in the *Journal of Accountancy*. The first is the monthly column titled "Technology Q&A," which often contains answers to questions about how do you do something in a newer version of Excel that you know how to do in an older version. The second type of article is a complete tutorial about a powerful way to use one or more Excel functions to automate a recurring task. Often, this second type of article has an online spreadsheet file that you can download and use to follow along with the example and thereby teach yourself a new skill.

The *Journal of Accountancy* web site maintains an archive of these articles that you can search to see if there is one that addresses a task that is new for you. Even if the article explains how to do something (such as create a pivot table) in an older version of Excel, in most cases you will find that many of the steps have not changed. For those that have, if you read

the old way to do it as described in the article, you can then use Excel's built-in help feature to see how to do the same task in the newer version that you are now using.

The Excel homework problems in the five business process chapters in this textbook let you practice using *Journal of Accountancy* articles to help you develop new skills with Excel. Many of the problems reference a *Journal of Accountancy* tutorial article. Some are written for the version of Excel that you currently use, in which case it will be straightforward to follow the article to solve the problem. Others, however, were written for earlier versions of Excel, which gives you an opportunity to practice learning how to use Excel's help functions to update the steps in the tutorial.

Content and Organization

This text is divided into five parts, each focused on a major theme.

PART I: CONCEPTUAL FOUNDATIONS OF ACCOUNTING INFORMATION SYSTEMS

Part I consists of four chapters which present the underlying concepts fundamental to an understanding of AIS. Chapter 1 introduces basic terminology and provides an overview of AIS topics. It discusses how an AIS can add value to an organization and how it can be used to help organizations implement corporate strategy. It also discusses the types of information companies need to successfully operate and introduces the basic business processes that produce that information. It concludes by describing the role of the AIS in an organization's value chain.

Chapter 2 introduces transaction processing in automated systems, presenting basic information input/output, processing, and data storage concepts. You will see the wide range of data that must be collected by the AIS. This information helps you to understand what an AIS does; as you read the remainder of the book, you will see how advances in IT affect the manner in which those functions are performed. Chapter 2 also introduces you to Enterprise Resource Planning (ERP) systems and discusses their importance and uses in modern business.

Chapter 3 covers three of the most important tools and techniques used to understand, evaluate, design, and document information systems: data flow diagrams, business process diagrams, and flowcharts. You will learn how to read, critique, and create systems documentation using these tools.

Chapter 4 introduces the topic of databases, with a particular emphasis on the relational data model and creating queries in Microsoft Access. The chapter also introduces the concept of business intelligence.

PART II: CONTROL AND AUDIT OF ACCOUNTING INFORMATION SYSTEMS

The seven chapters in Part II focus on threats to the reliability of AIS and applicable controls for addressing and mitigating the risks associated with those threats. Chapter 5 introduces students to the different kinds of threats faced by information systems, primarily focusing on the threat of fraud. The chapter describes the different types of fraud and explains how fraud is perpetrated, who perpetrates it, and why it occurs.

Chapter 6 discusses computer fraud and abuse techniques. Three major types of computer fraud are discussed: computer attacks and abuse, social engineering, and malware. The chapter explains the dozens of ways computer fraud and abuse can be perpetrated.

Chapter 7 uses the COSO framework, including the expanded enterprise risk management (COSO-ERM) model, to discuss the basic concepts of internal control. It also introduces the COBIT framework which applies those concepts to IT, thereby providing a foundation for effective governance and control of information systems.

Chapter 8 focuses on information security. It introduces the fundamental concepts of defense-in-depth and the time-based approach to security. The chapter provides a broad survey of a variety of security topics including access controls, firewalls, encryption, and incident detection and response.

Chapter 9 discusses the many specific computer controls used in business organizations to achieve the objectives of ensuring privacy and confidentiality, and includes a detailed explanation of encryption.

Chapter 10 addresses the controls necessary to achieve the objectives of accurate processing of information and ensuring that information is available to managers whenever and wherever they need it.

Chapter 11 describes principles and techniques for the audit and evaluation of internal control in a computer-based AIS and introduces the topic of computer-assisted auditing.

PART III: ACCOUNTING INFORMATION SYSTEMS APPLICATIONS

Part III focuses on how a company's AIS provides critical support for its fundamental business processes. Most large and many medium-sized organizations use enterprise resource planning (ERP) systems to collect, process, and store data about their business processes, as well as to provide information reports designed to enable managers and external parties to assess the organization's efficiency and effectiveness. To make it easier to understand how an ERP system functions, Part III consists of five chapters, each focusing on a particular business process.

Chapter 12 covers the revenue cycle, describing all the activities involved in taking customer orders, fulfilling those orders, and collecting cash.

Chapter 13 covers the expenditure cycle, describing all the activities involved in ordering, receiving, and paying for merchandise, supplies, and services.

Chapter 14 covers the production cycle, with a special focus on the implications of recent cost accounting developments, such as activity-based costing, for the design of the production cycle information system.

Chapter 15 covers the human resources management/payroll cycle, focusing primarily on the activities involved in processing payroll.

Chapter 16 covers the general ledger and reporting activities in an organization, discussing topics such as XBRL, the balanced scorecard, the switch from GAAP to IFRS, and the proper design of graphs to support managerial decision making.

Each of these five chapters explains the three basic functions performed by the AIS: efficient transaction processing, provision of adequate internal controls to safeguard assets (including data), and preparation of information useful for effective decision making.

PART IV: THE REA DATA MODEL

Part IV consists of three chapters that focus on the REA data model, which provides a conceptual tool for designing and understanding the database underlying an AIS. Chapter 17 introduces the REA data model and how it can be used to design an AIS database. The chapter focuses on modeling the revenue and expenditure cycles. It also demonstrates how the REA model can be used to develop an AIS that can not only generate traditional financial statements and reports but can also more fully meet the information needs of management.

Chapter 18 explains how to implement an REA data model in a relational database system. It also shows how to query a relational database in order to produce various financial statements and management reports.

Chapter 19 explains how to develop REA data models of the production, HR/payroll, and financing cycles. It also discusses a number of advanced modeling issues, such as the acquisition and sale of intangible products and services and rental transactions.

PART V: THE SYSTEMS DEVELOPMENT PROCESS

Part V consists of three chapters that cover various aspects of the systems development process. Chapter 20 introduces the systems development life cycle and discusses the introductory steps of this process (systems analysis, feasibility, and planning). Particular emphasis is placed on the behavioral ramifications of change.

Chapter 21 discusses an organization's many options for acquiring or developing an AIS (e.g., purchasing software, writing software, end-user-developed software, and outsourcing) and for speeding up or improving the development process (business process reengineering, prototyping, agile methodologies, and computer-assisted software engineering).

Chapter 22 covers the remaining stages of the systems development life cycle (conceptual design, physical design, implementation, and operation and maintenance) and emphasizes the interrelationships among the phases.

Acknowledgments

We wish to express our appreciation to all supplements authors for preparing the various supplements that accompany this edition. We thank Martha M. Eining of the University of Utah and Carol F. Venable of San Diego State University for preparing the comprehensive cases included on our Web site. We are also grateful to Iris Vessey for her contributions to the problem material. We thank Bill Heninger of Brigham Young University for allowing us to use portions of his database normalization tutorial to create the Appendix to Chapter 4.

Perhaps most importantly, we are indebted to the numerous faculty members throughout the world who have adopted the earlier editions of this book and who have been generous with their suggestions for improvement. We are especially grateful to the following faculty who participated in reviewing the fourteenth edition throughout various stages of the revision process:

Kamal Hingorani, *Alabama State University*
A. Ruth Prato, *University of Alaska Fairbanks*
Srinivasan Ragothaman, *University of South Dakota*
Ankita Singhvi, *Suffolk University*

We are grateful for permission received from four professional accounting organizations to use problems and unofficial solutions from their past professional examinations in this book. Thanks are extended to the American Institute of Certified Public Accountants for use of the CPA Examination materials, to the Institute of Certified Management Accountants for use of CMA Examination materials, to the Institute of Internal Auditors for use of CIA Examination materials, and to the Society of Management Accountants of Canada for use of SMAC Examination materials. We also wish to thank Netsuite, Inc., for providing permission to use screenshots of their software throughout the text.

Of course, any errors in this book remain our responsibility. We welcome your comments and suggestions for further improvement.

Finally, we want to thank our wives and families for their love, support, and encouragement. We also want to thank God for giving us the ability to start and complete this book.

— Marshall B. Romney
Provo, Utah
—Paul John Steinbart
Tempe, Arizona

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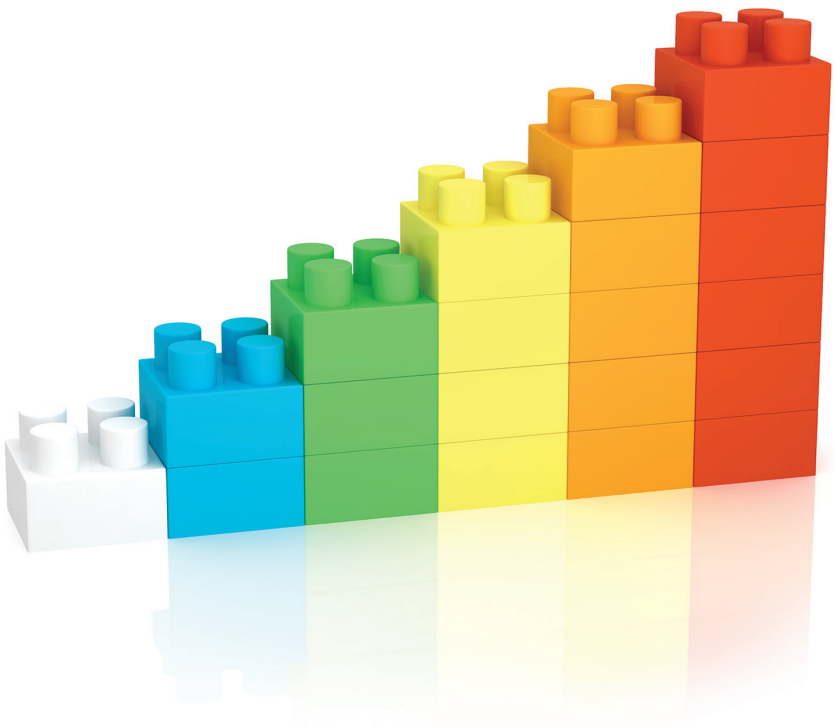
Conceptual Foundations of Accounting Information Systems

PART

I



CHAPTER

1

Accounting Information Systems: An Overview

LEARNING OBJECTIVES

After studying this chapter, you should be able to:

1. Distinguish data from information, discuss the characteristics of useful information, and explain how to determine the value of information.
2. Explain the decisions an organization makes, the information needed to make them, and the major business processes present in most companies.
3. Explain how an AIS adds value to an organization, how it affects and is affected by corporate strategy, and its role in a value chain.

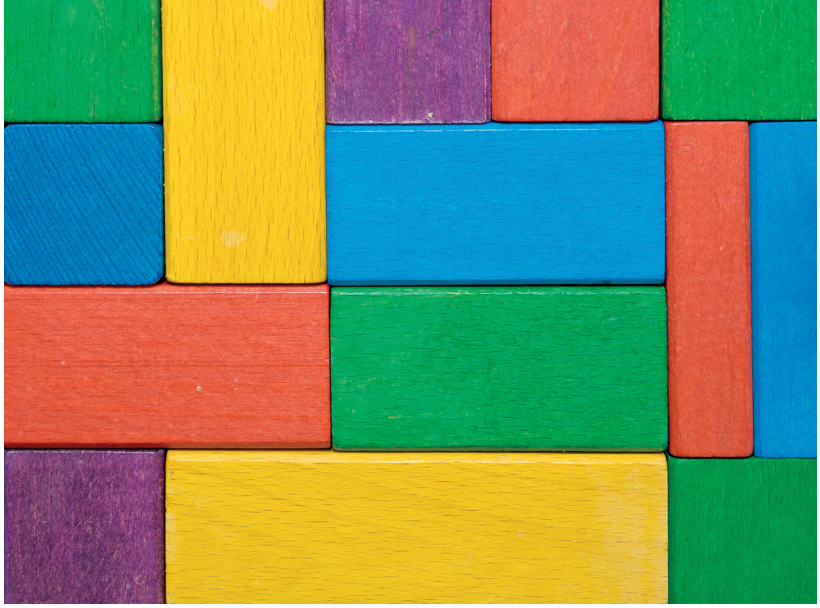
INTEGRATIVE CASE S&S

After working for years as a regional manager for a retail organization, Scott Parry opened his own business with Susan Gonzalez, one of his district managers, as his partner. They formed S&S to sell appliances and consumer electronics. Scott and Susan pursued a "clicks and bricks" strategy by renting a building in a busy part of town and adding an electronic storefront.

Scott and Susan invested enough money to see them through the first six months. They will hire 15 employees within the next two weeks—three to stock the shelves, four sales representatives, six checkout clerks, and two to develop and maintain the electronic storefront.

Scott and Susan will host S&S's grand opening in five weeks. To meet that deadline, they have to address the following important issues:

1. What decisions do they need to make to be successful and profitable? For example:
   a. How should they price products to be competitive yet earn a profit?
   b. Should they extend credit, and, if so, on what terms? How can they accurately track what customers owe and pay?
   c. How should they hire, train, and supervise employees? What compensation and benefits package should they offer? How should they process payroll?
   d. How can they track cash inflows and outflows to avoid a cash squeeze?
   e. What is the appropriate product mix? What inventory quantities should they carry, given their limited showroom space?



2. What information do Scott and Susan need to make those decisions?
   a. What information do the external entities they interact with need?
   b. What information do management and other employees need?
   c. How can they gather, store, and disseminate that information?
3. What business processes are needed, and how should they be carried out?
4. What functionality should be provided on the website?

Although Scott and Susan could use an educated guess or "gut feeling" to make these decisions, they know they can make better decisions if they obtain additional information. A well-designed AIS can solve these issues and provide the information they need to make any remaining decisions.

Introduction

We begin this chapter by explaining important terms and discussing the kinds of information that organizations need and the business processes used to produce that information. We continue with an exploration of what an accounting information system (AIS) is, how an AIS adds value to an organization, how an AIS and corporate strategy affect each other, and the role of the AIS in the value chain.

A **system** is a set of two or more interrelated components that interact to achieve a goal. Most systems are composed of smaller subsystems that support the larger system. For example, a college of business is a system composed of various departments, each of which is a subsystem. Moreover, the college itself is a subsystem of the university.

Each subsystem is designed to achieve one or more organizational goals. Changes in subsystems cannot be made without considering the effect on other subsystems and on the system as a whole. **Goal conflict** occurs when a subsystem's goals are inconsistent with the goals of another subsystem or with the system as a whole. **Goal congruence** occurs when a subsystem achieves its goals while contributing to the organization's overall goal. The larger the organization and the more complicated the system, the more difficult it is to achieve goal congruence.

Data are facts that are collected, recorded, stored, and processed by an information system. Businesses need to collect several kinds of data, such as the activities that take place, the resources affected by the activities, and the people who participate in the activity. For example, the business needs to collect data about a sale (date, total amount), the resource sold (good or service, quantity sold, unit price), and the people who participated (customer, salesperson).

Information is data that have been organized and processed to provide meaning and improve the decision-making process. As a rule, users make better decisions as the quantity and quality of information increase.

system - Two or more interrelated components that interact to achieve a goal, often composed of subsystems that support the larger system.

goal conflict - When a subsystem's goals are inconsistent with the goals of another subsystem or the system as a whole.

goal congruence - When a subsystem achieves its goals while contributing to the organization's overall goal.

data - Facts that are collected, recorded, stored, and processed by an information system.

information - Data that have been organized and processed to provide meaning and improve decision making.

TABLE 1-1 Characteristics of Useful Information

Relevant	Reduces uncertainty, improves decision making, or confirms or corrects prior expectations.
Reliable	Free from error or bias; accurately represents organization events or activities.
Complete	Does not omit important aspects of the events or activities it measures.
Timely	Provided in time for decision makers to make decisions.
Understandable	Presented in a useful and intelligible format.
Verifiable	Two independent, knowledgeable people produce the same information.
Accessible	Available to users when they need it and in a format they can use.

information overload - Exceeding the amount of information a human mind can absorb and process, resulting in a decline in decision-making quality and an increase in the cost of providing information.

Information technology (IT) - The computers and other electronic devices used to store, retrieve, transmit, and manipulate data.

value of information - The benefit provided by information less the cost of producing it.

However, there are limits to the amount of information the human mind can absorb and process. **Information overload** occurs when those limits are passed, resulting in a decline in decision-making quality and an increase in the cost of providing that information. Information system designers use **information technology (IT)** to help decision makers more effectively filter and condense information. For example, Walmart has over 500 terabytes (trillions of bytes) of data in its data warehouse. That is equivalent to 2,000 miles of bookshelves, or about 100 million digital photos. Walmart has invested heavily in IT so it can effectively collect, store, analyze, and manage data to provide useful information.

The **value of information** is the benefit produced by the information minus the cost of producing it. Benefits of information include reduced uncertainty, improved decisions, and improved ability to plan and schedule activities. The costs include the time and resources spent to produce and distribute the information. Information costs and benefits can be difficult to quantify, and it is difficult to determine the value of information before it has been produced and utilized. Nevertheless, the expected value of information should be calculated as effectively as possible so that the costs of producing the information do not exceed its benefits.

To illustrate the value of information, consider the case of 7-Eleven. When a Japanese company licensed the very successful 7-Eleven name from Southland Corporation, it invested heavily in IT. However, the U.S. stores did not. Each 7-Eleven store in Japan was given a computer that:

- Keeps track of the 3,000 items sold in each store and determines what products are moving, at what time of day, and under what weather conditions.
- Keeps track of what and when customers buy to make sure it has in stock the products most frequently purchased.
- Orders sandwiches and rice dishes from suppliers automatically. Orders are placed and filled three times a day so that stores always have fresh food. In addition, suppliers can access 7-Eleven sales data electronically so that they can forecast demand.
- Coordinates deliveries with suppliers. This reduces deliveries from 34 to 12 a day, resulting in less clerical receiving time.
- Prepares a color graphic display that indicates which store areas contribute the most to sales and profits.

Average daily sales of 7-Eleven Japan were 30% higher and its operating margins almost double those of its closest competitor. What happened to Southland and its 7-Eleven stores in the United States? Profits declined, and Southland eventually had to file for bankruptcy. 7-Eleven Japan came to the company's rescue and purchased 64% of Southland.

Table 1-1 presents seven characteristics that make information useful and meaningful.

Information Needs and Business Processes

business process - A set of related, coordinated, and structured activities and tasks, performed by a person, a computer, or a machine, that help accomplish a specific organizational goal.

All organizations need information in order to make effective decisions. In addition, all organizations have certain business processes in which they are continuously engaged. A **business process** is a set of related, coordinated, and structured activities and tasks that are performed by a person, a computer, or a machine, and that help accomplish a specific organizational goal.

To make effective decisions, organizations must decide what decisions they need to make, what information they need to make the decisions, and how to gather and process the data needed to produce the information. This data gathering and processing is often tied to the basic business processes in an organization. To illustrate the process of identifying information needs and business processes, let's return to our S&S case study.

INFORMATION NEEDS

Scott and Susan decide they must understand how S&S functions before they can identify the information they need to manage S&S effectively. Then they can determine the types of data and procedures they will need to collect and produce that information. They created Table 1-2

TABLE 1-2 Overview of S&S's Business Processes, Key Decisions, and Information Needs

BUSINESS PROCESSES	KEY DECISIONS	INFORMATION NEEDS
Acquire capital	How much	Cash flow projections
	Find investors or borrow funds	Pro forma financial statements
	If borrowing, obtain best terms	Loan amortization schedule
Acquire building and equipment	Size of building	Capacity needs
	Amount of equipment	Building and equipment prices
	Rent or buy	Market study
	Location	Tax tables and depreciation regulations
	How to depreciate	
Hire and train employees	Experience requirements	Job descriptions
	How to assess integrity and competence of applicants	Applicant job history and skills
	How to train employees	
Acquire inventory	What models to carry	Market analyses
	How much to purchase	Inventory status reports
	How to manage inventory (store, control, etc.)	Vendor performance
	Which vendors	
Advertising and marketing	Which media	Cost analyses
	Content	Market coverage
Sell merchandise	Markup percentage	Pro forma income statement
	Offer in-house credit	Credit card costs
	Which credit cards to accept	Customer credit status
Collect payments from customers	If offering credit, what terms	Customer account status
	How to handle cash receipts	Accounts receivable aging report
		Accounts receivable records
Pay employees	Amount to pay	Sales (for commissions)
	Deductions and withholdings	Time worked (hourly employees)
	Process payroll in-house or use outside service	W-4 forms
		Costs of external payroll service
Pay taxes	Payroll tax requirements	Government regulations
	Sales tax requirements	Total wage expense
		Total sales
Pay vendors	Whom to pay	Vendor invoices
	When to pay	Accounts payable records
	How much to pay	Payment terms

to summarize part of their analysis. It lists S&S's basic business processes, some key decisions that need to be made for each process, and information they need to make the decisions.

Scott and Susan realize that the list is not exhaustive, but they are satisfied that it provides a good overview of S&S. They also recognize that not all the information needs listed in the right-hand column will be produced internally by S&S. Information about payment terms for merchandise purchases, for example, will be provided by vendors. Thus, S&S must effectively integrate external data with internally generated data so that Scott and Susan can use both types of information to run S&S.

S&S will interact with many external parties, such as customers, vendors, and governmental agencies, as well as with internal parties such as management and employees. To get a better handle on the more important interactions with these parties, they prepared Figure 1-1.

transaction - An agreement between two entities to exchange goods or services, such as selling inventory in exchange for cash; any other event that can be measured in economic terms by an organization.

transaction processing - Process of capturing transaction data, processing it, storing it for later use, and producing information output, such as a managerial report or a financial statement.

give-get exchange - Transactions that happen a great many times, such as giving up cash to get inventory from a supplier and giving employees a paycheck in exchange for their labor.

business processes or transaction cycles - The major give-get exchanges that occur frequently in most companies.

revenue cycle - Activities associated with selling goods and services in exchange for cash or a future promise to receive cash.

BUSINESS PROCESSES

Scott decides to reorganize the business processes listed in Table 1-2 into groups of related transactions. A **transaction** is an agreement between two entities to exchange goods or services or any other event that can be measured in economic terms by an organization. Examples include selling goods to customers, buying inventory from suppliers, and paying employees. The process that begins with capturing transaction data and ends with informational output, such as the financial statements, is called **transaction processing**. Transaction processing is covered in more depth in Chapter 2.

Many business activities are pairs of events involved in a **give-get exchange**. Most organizations engage in a small number of give-get exchanges, but each type of exchange happens many times. For example, S&S will have thousands of sales to customers every year in exchange for cash. Likewise, S&S will continuously buy inventory from suppliers in exchange for cash.

These exchanges can be grouped into five major **business processes or transaction cycles**:

- The **revenue cycle**, where goods and services are sold for cash or a future promise to receive cash. This cycle is discussed in Chapter 12.

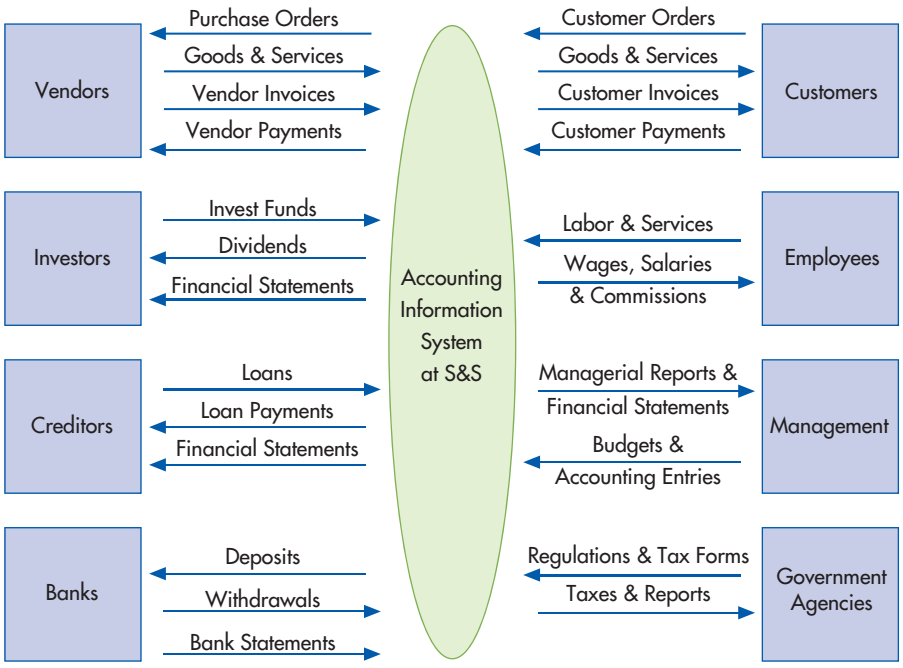


FIGURE 1-1
Interactions between S&S and External and Internal Parties

- The **expenditure cycle**, where companies purchase inventory for resale or raw materials to use in producing products in exchange for cash or a future promise to pay cash. This cycle is discussed in Chapter 13.
- The **production or conversion cycle**, where raw materials are transformed into finished goods. This cycle is discussed in Chapter 14.
- The **human resources/payroll cycle**, where employees are hired, trained, compensated, evaluated, promoted, and terminated. This cycle is discussed in Chapter 15.
- The **financing cycle**, where companies sell shares in the company to investors and borrow money, and where investors are paid dividends and interest is paid on loans.

expenditure cycle - Activities associated with purchasing inventory for resale or raw materials in exchange for cash or a future promise to pay cash.

production or conversion cycle - Activities associated with using labor, raw materials, and equipment to produce finished goods.

human resources/payroll cycle - Activities associated with hiring, training, compensating, evaluating, promoting, and terminating employees.

financing cycle - Activities associated with raising money by selling shares in the company to investors and borrowing money as well as paying dividends and interest.

These cycles process a few related transactions repeatedly. For example, most revenue cycle transactions are either selling goods or services to customers or collecting cash for those sales. Figure 1-2 shows the main transaction cycles and the give-get exchange inherent in each cycle.

These basic give-get exchanges are supported by a number of other business activities. For example, S&S may need to answer a number of customer inquiries and check inventory levels before it can make a sale. Likewise, it may have to check customer credit before a credit sale is made. Accounts receivable will have to be increased each time a credit sale is made

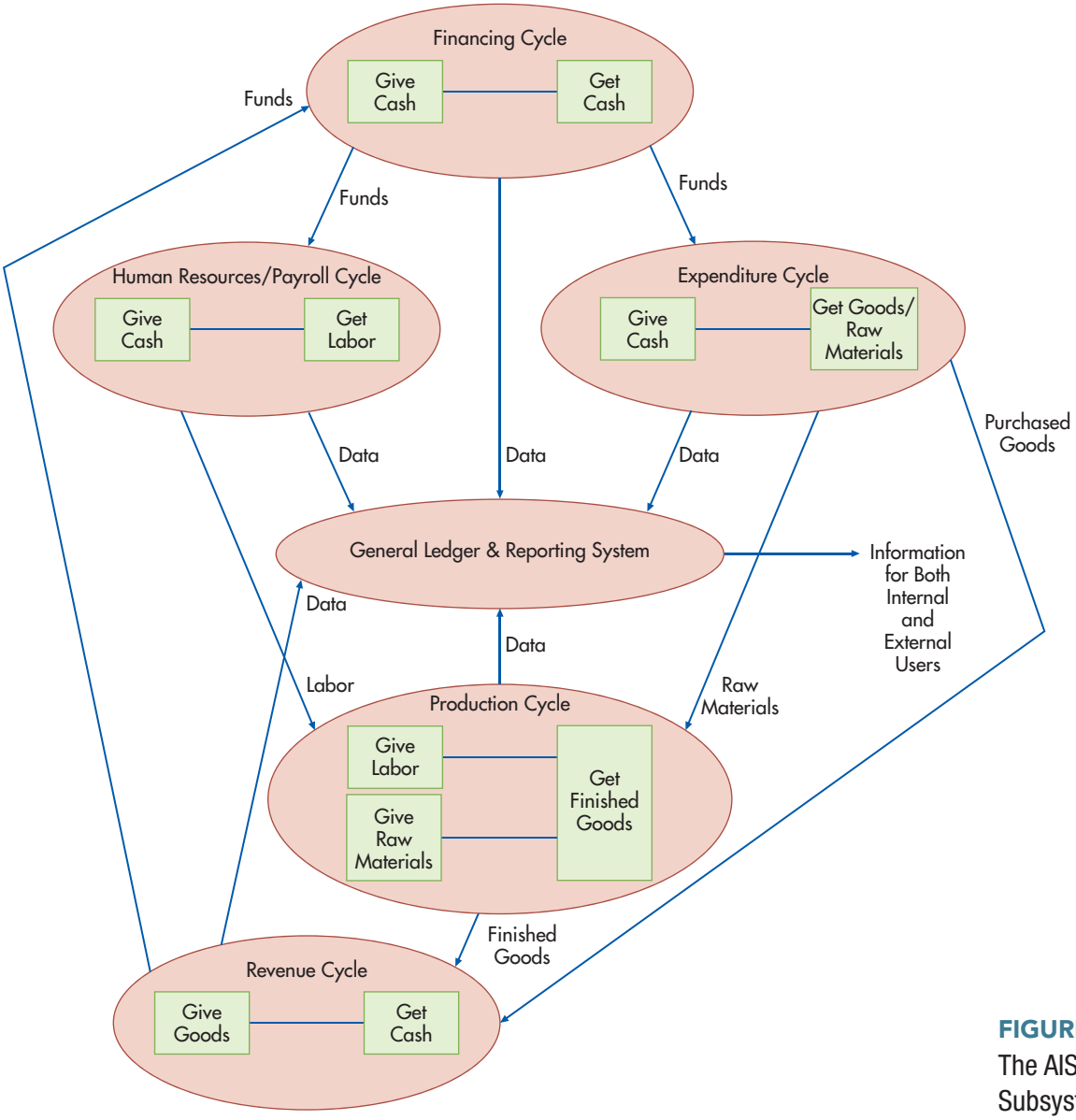


FIGURE 1-2
The AIS and Its Subsystems

and decreased each time a customer payment is received. Table 1-3 lists the major activities in each transaction cycle.

Notice that the last activity listed in Table 1-3 for each transaction cycle is "Send appropriate information to the other cycles." Figure 1-2 shows how these various transaction cycles relate to one another and interface with the **general ledger and reporting system**, which is used to generate information for both management and external parties. The general ledger and reporting system is discussed in more depth in Chapter 16.

general ledger and reporting system - Information-processing operations involved in updating the general ledger and preparing reports for both management and external parties.

In many accounting software packages, the various transaction cycles are implemented as separate modules. Not every organization needs to implement every module. Retail stores like S&S, for example, do not have a production cycle and would not implement that

TABLE 1-3 Common Cycle Activities

TRANSACTION CYCLE	MAJOR ACTIVITIES IN THE CYCLE
Revenue	Receive and answer customer inquiries
	Take customer orders and enter them into the AIS
	Approve credit sales
	Check inventory availability
	Initiate back orders for goods out of stock
	Pick and pack customer orders
	Ship goods to customers or perform services
	Bill customers for goods shipped or services performed
	Update (increase) sales and accounts receivable
	Receive customer payments and deposit them in the bank
	Update (reduce) accounts receivable
	Handle sales returns, discounts, allowances, and bad debts
	Prepare management reports
	Send appropriate information to the other cycles
Expenditure	Request goods and services be purchased
	Prepare, approve, and send purchase orders to vendors
	Receive goods and services and complete a receiving report
	Store goods
	Receive vendor invoices
	Update (increase) accounts payable
	Approve vendor invoices for payment
	Pay vendors for goods and services
	Update (reduce) accounts payable
	Handle purchase returns, discounts, and allowances
	Prepare management reports
	Send appropriate information to the other cycles
Human Resources/Payroll	Recruit, hire, and train new employees
	Evaluate employee performance and promote employees
	Discharge employees
	Update payroll records
	Collect and validate time, attendance, and commission data
	Prepare and disburse payroll
	Calculate and disburse taxes and benefit payments

TABLE 1-3 Continued

TRANSACTION CYCLE	MAJOR ACTIVITIES IN THE CYCLE
	Prepare employee and management reports
	Send appropriate information to the other cycles
Production	Design products
	Forecast, plan, and schedule production
	Request raw materials for production
	Manufacture products
	Store finished products
	Accumulate costs for products manufactured
	Prepare management reports
	Send appropriate information to the other cycles
Financing	Forecast cash needs
	Sell stock/securities to investors
	Borrow money from lenders
	Pay dividends to investors and interest to lenders
	Retire debt
	Prepare management reports
	Send appropriate information to the other cycles

module. Moreover, some organizations have unique requirements. Financial institutions, for example, have demand deposit and installment-loan cycles that relate to transactions involving customer accounts and loans. In addition, the nature of a given transaction cycle differs across different types of organizations. For example, the expenditure cycle of a service company, such as a public accounting or a law firm, does not normally involve processing transactions related to the purchase, receipt, and payment for merchandise that will be resold to customers.

Each transaction cycle can include many different business processes or activities. Each business process can be relatively simple or quite complex. Focus 1-1 shows how Toyota's attention to continuously improving its business processes has helped it become the largest and most profitable automobile manufacturer in the world.

FOCUS 1-1 Improving Business Processes Helps Drive Toyota's Success

Toyota's Georgetown, Kentucky, manufacturing plant, its largest in North America, is the size of 156 football fields, employs 7,000 people, and produces a new car every 55 seconds. Because Toyota produces a high-quality car at a lower cost than its competitors, it is the largest automobile manufacturer in the world, a title General Motors had for almost 100 years.

A major factor in its success is the Toyota Production System (TPS), which is a set of philosophies, principles, and business processes supported by IT. Its goal is to improve continually so Toyota has the most effective and most efficient manufacturing and business processes possible. Toyota willingly shares TPS and its manufacturing and business processes with its suppliers to help them improve their quality and efficiency. It also shares TPS with its competitors, knowing that by the time they duplicate it Toyota will have greatly improved TPS.

The following are some of the principles and business processes on which TPS is built and which Toyota's information systems must support and enable:

- Performance-monitoring software warns assembly line workers of equipment problems. Workers stop production whenever necessary to prevent or correct defects.

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